aeroQUAL

Series 300, 305, 500 & 505

Monitor

User Guide

aeroQUAL

Contents

Foreword	**1**
Statements of Compliance	**2**
Warranty	**3**
For Your Safety	**5**
Monitor Components	**6**
About Your Monitor	**7**
Assembly, Wiring and Installation	**8**
Operating Instructions	**14**
Turning the monitor on and off	*14*
Turning Standby Mode on and off	*15*
Operating under Battery Power	*15*
Sensor Head Failure	*15*
Using the Menus and Key Functions	**16**
Zero Cal – Resetting the Zero Point	*16*
Setting the Clock	*17*
Setting High and Low Alarms	*18*
Setting the Control Points	*21*
Setting up Data Logging Time Intervals	*22*
Changing Unit of Measurement	*23*
The Max/ Min/ Average Measurement Cycle	*23*
Starting and Stopping Data Logging	*24*
Aeroqual Monitor Software Instructions	**25**
Software Installation	*25*
Running the Software Program	*26*
Setting up the Software and Monitor Parameters	*27*
Gas Sensor Properties Configuration	*28*
Communications Port Configuration	*29*
Setting the Graph Default Style	*30*
Setting Data Logging Functions	*31*
Graphing and Data Analysis Functions	*34*
Daily Summary Analysis	*37*
Advanced Data Management	*39*
Trouble Shooting	**41**
Diagnostic Features	**43**
Battery Information	**43**
Care and Maintenance	**45**
Disposal / Recycling	**45**
Specifications – Series 300, 500 & 505	**46**
Drawings	**47**
Sensor Head Specifications	**48-49**

aeroQUAL

Foreword

Copyright Aeroqual Limited. All rights reserved. Reproduction, transfer, distribution or storage of part or all of the contents of this document in any form without the prior written permission of Aeroqual Limited is prohibited.

“Aeroqual” and “Aeroqual Limited – Making the Invisible Visible” are registered trademarks of Aeroqual Limited. Other product and company names mentioned herein may also be trademarks or trade names.

Aeroqual operates a policy of continuous development. Aeroqual reserves the right to make changes and improvements to any of the products described in this document without prior notice.

Under no circumstances shall Aeroqual be responsible for any loss of data or income or any special, incidental, consequential or indirect damages howsoever caused.

The contents of this document are provided "as is". Except as required by applicable law, no warranties of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose, are made in relation to the accuracy, reliability or contents of this document.

Aeroqual reserves the right to revise this document or withdraw it at any time without prior notice. The availability of particular products may vary by region. Please check with the Aeroqual dealer nearest to you.

23.10.07

© Aeroqual Limited 2007. All rights reserved.

Aeroqual Limited
109 Valley Road, Mount Eden, Auckland 1024, New Zealand
phone +64 9 623 3013
fax +64 9 623 3012
web www.aeroqual.com

aeroQUAL

Statements of Compliance

1. The Aeroqual Series 300, 305, 500 & 505 Monitors and Remote Adaptor Kit comply with EN 50082-1:1997
2. The Aeroqual Series 300, 305, 500 & 505 Monitors and Remote Adaptor Kit comply with EN 50081-1:1992
3. The Aeroqual Series 300, 305, 500 & 505 Monitors and Remote Adaptor Kit comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) these devices may not cause harmful interference, and (2) these devices must accept any interference received, including interference that may cause undesired operation.

   NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

   — Reorient or relocate the receiving antenna.
   — Increase the separation between the equipment and receiver.
   — Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
   — Consult the dealer or an experienced radio/TV technician for help.

Warranty

Thank you for purchasing this Aeroqual product. To get maximum use of the features of your new product we recommend that you follow a few simple steps:

- Read the guidelines for safe and efficient use.
- Read all the terms and conditions of your Aeroqual Warranty.
- Save your original receipt. You will need it for warranty repair claims.

Should your Aeroqual product need warranty service, you should return it to the dealer from whom it was purchased or contact Aeroqual.

Our Warranty

Aeroqual warrants this product to be free from defects in material and workmanship at the time of its original purchase by a consumer, and for a subsequent period as stated in the following table:

Products	Warranty Period
Series 300, 305, 500 or 505 monitor base	One year from the date of purchase
Sensor heads – all gases	Six months from the date of purchase
Batteries	Three months from the date of purchase
Other Accessories	One year from the date of purchase

This warranty is expressly limited to the original owner who purchases the equipment directly from Aeroqual or from an authorized Aeroqual dealer.

What we will do

If, during the warranty period, this product fails to operate under normal use and service, due to improper materials or workmanship, Aeroqual subsidiaries, authorized distributors or authorized service partners will, at their option, either repair or replace the product in accordance with the terms and conditions stipulated herein.

Conditions

1. The warranty is valid only if the original receipt issued to the original purchaser by the dealer, specifying the date of purchase, is presented with the product to be repaired or replaced. Aeroqual reserves the right to refuse warranty service if this information has been removed or changed after the original purchase of the product from the dealer.

2. If Aeroqual repairs or replaces the product, the repaired or replaced product shall be warranted for the remaining time of the original warranty period or for ninety (90) days from the date of repair, whichever is longer. Repair or replacement may be via functionally equivalent reconditioned units. Replaced faulty parts or components will become the property of Aeroqual.

3. This warranty does not cover any failure of the product due to normal wear and tear, damage, misuse, including but not limited to use in any other than the normal and customary manner, in accordance with Aeroqual's user guide for use, faulty installation, calibration and maintenance of the product, accident, modification or adjustment, events beyond human control, improper ventilation and damage resulting from liquid or corrosion.

4. This warranty does not cover product failures due to repairs, modifications or improper service performed by a non-Aeroqual authorized service workshop or opening of the product by non-Aeroqual authorized persons.

5. The warranty does not cover product failures which have been caused by use of non-Aeroqual original accessories.

6. This warranty becomes void if a non-Aeroqual approved AC/DC adaptor or battery is used.

7. Tampering with any part of the product will void the warranty.

8. Damage to the sensors can occur through exposure to certain sensor poisons such as silicones, tetraethyl lead, paints and adhesives. Use of Aeroqual sensors in these environments containing these materials may (at the discretion of Aeroqual) void the warranty on the sensor head. Exposure to gas concentrations outside of the design range of a specific Aeroqual sensor head can adversely affect the calibration of that sensor head and will also void this warranty as it applies to the replacement of sensor heads.

9. Aeroqual makes no other express warranties, whether written or oral, other than contained within this printed limited warranty. To the fullest extent allowable by law all warranties implied by law, including without limitation the implied warranties of merchantability and fitness for a particular purpose, are expressly excluded, and in no event shall Aeroqual be liable for incidental or consequential damages of any nature whatsoever, however they arise, from the purchase or use of the product, and including but not limited to lost profits or business loss.

10. Some countries restrict or do not allow the exclusion or limitation of incidental or consequential damage, or limitation of the duration of implied warranties, so the preceding limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which may vary from country to country.

WARNING

- ***Do not*** **switch the monitor on before reading the User Guide.**
- ***Do not*** **expose the monitor to gas concentrations above the recommended maximum range**
- ***Do not*** **place the sensor head in a gas stream – the monitor is designed to measure ambient levels of ozone and uses *'active sampling'* to achieve this.**

For Your Safety

Read these simple guidelines. Ignoring these guidelines may be hazardous.

- **USE SENSIBLY**
  Use only as per this user guide.
- **USE AEROQUAL APPROVED SERVICE**
  Only approved service personnel must work on this product.
- **ACCESSORIES**
  Use only approved accessories. Do not connect incompatible products.
- **CONNECTING TO OTHER DEVICES**
  When connecting to any other device, read the appropriate user guide for detailed safety instructions. Do not connect incompatible products.
- **HAZARDOUS ENVIRONMENTS**
  Do not use the monitor in or near volatile fuel or chemicals.
- **HEALTH AND SAFETY IN THE WORKPLACE**
  The Aeroqual Series 300, 305, 500 & 505 Monitors and Sensor Heads are used to monitor ambient gas concentrations. Aeroqual does not guarantee user safety. In hazardous environments, an appropriate Health and Safety plan should be in place.

aeroQUAL

Monitor Components

Series 300 and 305 Monitor

The following components are supplied with the Series 300 and 305 Monitor:

- Series 300 or 305* monitor base
- Sensor head
- 12 VDC 800 mA AC/DC adaptor
- User guide
- Battery pack (optional) – 9.6 V Ni-MH

Series 500 and 505 Monitor

The following components are supplied with the Series 500 and 505 Monitor:

- Series 500 or 505* monitor base
- Sensor head
- Data logging software on CD
- Serial cable and USB to Serial adapter (with instructions)
- 12 VDC 800 mA AC/DC adaptor
- User guide
- Battery pack (optional) – 9.6 V Ni-MH

* Series 305 and 505 monitor base is fitted with a temperature and relative humidity sensor.

Please check that all these components have been supplied and contact your dealer or Aeroqual on email at: sales@aeroqual.com if any of the components are missing.

About Your Monitor

The Aeroqual **Series 300, 305, 500 and 505 Monitors** have been specifically designed to incorporate Aeroqual's in-depth knowledge of accurate ambient gas measurement. Different sensor heads are used for specific gases or depending upon whether high or low concentrations are to be measured. All the sensor heads are interchangeable on the same base unit.

The following information details the operation and features of the monitors:

1. The monitors are modular in design and are comprised of **two main components**, a Series 300, 305, 500 or 505 monitor, and a sensor head. This affords the user the ability to replace faulty sensor heads without having to replace the monitor. The monitors can be mains and/or battery powered and either permanently mounted or used as portable units.
2. The sensor head is calibrated prior to delivery and does **not normally need to be re-calibrated** during its life. (Specific user guides are supplied for the special operations of particular sensor heads).
3. The Aeroqual **Series 300, 305, 500 and 505 Monitors** come with on-board diagnostics, which will inform the user if the sensor is not operating correctly.
4. **High and low alarms**. The high alarm is indicated by flashing arrows pointing upwards accompanied by a fast beeping sound. Similarly the low alarm is indicated by flashing arrows pointing downwards accompanied by a slow beeping sound. This sets both the monitor and external alarms.
5. **Alarm mute.** Two alarm mute functions are available, temporary and permanent mute. Temporary mute is only active during the specific alarm condition, while permanent mute will remain on until reset by the user. The alarm arrow indications remain active during both temporary and permanent mute.
6. **Control.** This enables external equipment to be controlled by the monitor using the high and low control settings, which can be used to control an external device.
7. **Concentration unit selection.** The concentration can be displayed in either ppm or mg/m3.
8. **Min / max / average measurement cycle.** The monitor will display the minimum, maximum, average and 15-minute average gas concentrations over the measurement period. The Series 305 & 505 will also show temperature and relative humidity in addition to gas concentration.

aeroQUAL

9. **0-5V Analogue signal.** A proportional voltage output is available from the external output. The voltage relates to the gas concentration, with 0 V representing 0 concentration and 5 V representing the maximum concentration specified by the range. For example, 0 V represents 0 ppm and 5 V representing 0.500 ppm for the Low Concentration Ozone Sensor Head.

Note: See "Diagnostic Features" on page 42 for output status conditions.

The Series 500 & 505 Monitors offer the following additional features:

1. **Data logging** (on either the Series 500 or 505 Monitor or directly to a PC). The monitor is able to log up to 8000 data points. The data can be downloaded to a PC for analysis and record purposes. Data can also be logged directly to a PC via a serial connection while displaying real time data on the PC. The data logging interval can be set in one minute increments from either the monitor or the PC.
   The Series 505 monitor also measures and data logs temperature and relative humidity.
2. **Real time clock** (24 hr). The clock has a back up clock battery which will maintain the real time even when all power is lost to the monitor. Once power is restored data logging will continue if the unit was data logging at the time power was lost.
3. **PC setup of monitor parameters**. All the monitor parameters, i.e. clock setup, alarm setup, external control setup, logging setup and concentration units can be set up from the PC.

Assembly, Wiring and Installation

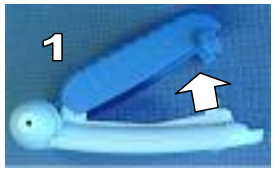
Assembly

The following needs to be completed before the Monitor is ready for use: -

- Insert the sensor head into the top of the monitor. The sensor head is keyed to ensure the head is inserted correctly.
- If the monitor is a mains only unit it is ready for use. If the monitor is to be used as a portable unit with batteries then the batteries must be installed and charged prior to use.

Installing the Battery Pack

- Remove the battery cover from the monitor.
- Insert the battery power connector into the monitor power socket in the back of the monitor.
- Lay the battery cable into the slot on the back of the monitor and insert the tail end of the battery pack into the hinge points at the bottom of the monitor back cover.
- Clip the top end of the battery pack into the top clips, taking note to orientate the battery pack per the instructions on the battery pack.
- Replace the battery cover on the monitor.



Notes on the battery pack

For more information on the correct use of the Ni-MH battery pack, please refer to 'Battery Information' on Page 43.

aeroQUAL

Rechargeable Batteries

The optional Ni-MH (Nickel Metal Hydride) battery pack is used to power the monitor as a portable unit. Please read the following information carefully before using the battery pack to operate the Aeroqual monitor.

Safety

- Do not use the battery pack for any other purpose than operating the Aeroqual monitor
- Do not disassemble or mutilate the batteries as this may cause burns
- Do not incinerate or heat as this may cause burns, the batteries may burst or cause the release of toxic materials
- Do not short circuit as this may cause burns
- Use only batteries approved by Aeroqual and recharge your battery only with the AC/DC adaptors supplied by Aeroqual.
- Never use any charger or battery that is damaged or worn out.
- Batteries must be recycled or disposed of properly. They must not be disposed of in municipal waste.
- Never charge a Ni-MH in a hermitically sealed container.

Using the battery pack

The life of the battery pack will be affected by the way it is handled. Take good care of the battery pack and follow the guidelines suggested in the following section.

Charging and Discharging the Batteries

- ***NOTE: Battery charging occurs only when units (version 4.0 and above – as shown on the start-up screen) are switched on or in standby mode.*** Older versions are not fitted with intelligent charging and are best charged while switched off.
- During charging the battery symbol on the display flashes slowly.
- Battery can be charged with the sensor head installed or with the sensor head removed from the base. (Remember to switch off the monitor before removing the sensor head).
- Intelligent Charging Circuit on version V5.1 will stop charging the unit when battery is either;
  - Fully charged @ 10.5V
  - Has been charging for 15 hours
  - The battery is unable to hold any further charge (Unplugging the main power will reset the above charging conditions and charging will resume).
- If battery is unable to hold the full charge (often sign of battery aging), then monitor will show **RB** on the battery symbol, indicating the battery may need to be replaced.
- Unplugging the main power will reset the above charging conditions.
- New Ni-MH batteries must be fully charged prior to use. A new Ni-MH battery's full performance is achieved only after a number of complete charge and discharge cycles. A fully charged battery will run for approximately 7 hours.
  (Note: Perc sensor heads require more power and will run for a shorter time)
- The battery will normally charge in approximately 10 hours in Standby mode, in 15 hours in normal operating mode and in a shorter period, if the battery was not fully discharged.
- The batteries can be charged and discharged many times but will eventually wear out. When the operating time is noticeably shorter than normal, it is time to replace the batteries.
- It is not necessary to fully discharge the batteries. When not using the Series 300, 305, 500 or 505 Monitor as a portable unit, always plug in the mains adaptor to recharge the batteries with the monitor **switched on**.
- If left unused a fully charged battery will discharge itself over time.

aeroQUAL

Removing the Battery Pack

- Remove the battery cover from the monitor.
- Insert your thumb under the top left hand side of the battery pack and carefully lever the battery pack out from the retaining clips.
- Unclip the connector from the monitor.
- Replace the battery cover.

Installing the AC/DC adaptor

- Connect the AC/DC adaptor to the mains supply. Ensure that the adaptor is correctly rated for the power supply.
- Plug the adaptor into the monitor. The monitor can now be used as a mains unit. If the monitor is to be used as a portable unit the batteries will need to be charged.

Warm up

Prior to operation the monitor must be warmed up to burn off contaminants on the sensor. When the monitor is first switched on it will warm up for 3 minutes. Then the reading will flash for the next 7 minutes to indicate that the sensor is still in the warm up phase. It is recommended that the monitor is kept in Stand By mode when not being used to keep the sensor heated and prevent the build up of contaminants. The monitor should be run for 24 hours on mains power prior to use if it has been switched off for more than 7 days.

Warning: *Do not remove the sensor head while the monitor is switched on.* This may damage the unit. If the sensor head is removed under these conditions, the unit will automatically shut down.

Monitor and Sensor Versions

Turning the monitor on will display ***"*AEROQUAL MONITOR S300 / S305 / S500 / S505 V x.x*"*,** where **"V x.x"** represents the version of the monitor base. The display will then show **"SV6.0"** or similar, which indicates the software version installed on the sensor head.

External Control Wiring

The pin numbers for the external output connector are numbered from 1 to 6. Pin 1 is the closest pin to the power jack.

The pin designations are as follows:

1. 12 V DC
2. Analogue output 0-5 V
3. Control
4. High alarm
5. Low alarm
6. Ground

The RJ12 connector offers two possibilities for wiring, either a switch to GND or a 12V output. If the 12V output is used, the power for the relay coil is supplied by the Aeroqual AC/DC adaptor. In this case, ensure that the relay coil does not draw more than 150mA and that a protection diode is inserted across the relay coil.

If the switch to GND output is used, ensure that the relay coil does not draw more that 150mA, that the voltage does not exceed 24V and that a protection diode is inserted across the relay coil.

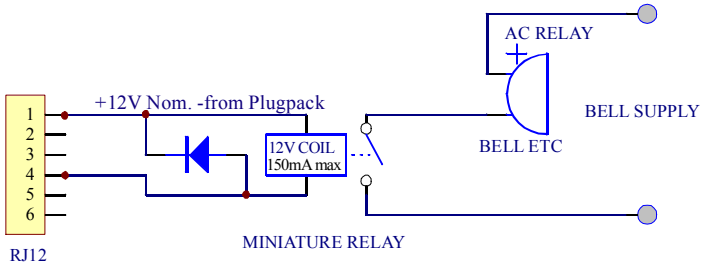
Wiring for alarm

The high alarm and low alarm pins can be wired to supply simple on / off switching to operate equipment which requires only an on or off signal, such as an alarm.

To switch to GND use pins 4, 5 and 6. For a 12V output wire to pins 4, 5 and 1 (see diagram on page 12 for typical wiring for high alarm). This feature will only operate while powered by the AC adaptor. The factory default settings are based on the gas sensor head selected at time of purchase.

aeroQUAL

High gas level alarm



WARNING

Failure to insert a circuit protection diode, shown as *above, will result in damage to the monitor if a voltage spike is created by the relay. (See Note: on page 46)*

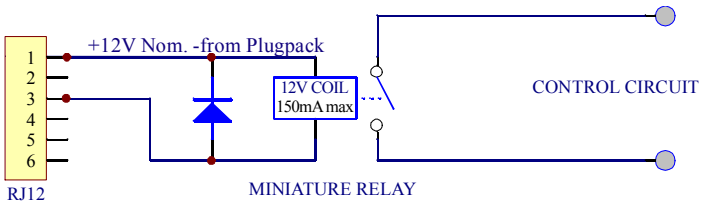
Wiring for control

The control pin can be wired to supply control of a gas concentration between upper and lower concentration limits. The upper and lower limits can be set by the user, thus affording the user the opportunity to customise the control. The factory default settings are dependent on the gas sensor head selected at time of purchase.

To switch to GND use pins 3 and 6. For a 12V output wire to pins 3 and 1 (see diagram on page 13 for typical wiring). This feature will only operate while powered by the AC adaptor.

Control is achieved by using a software latch. If power is lost to the monitor, the switch will open and therefore turn off the external device connected to the monitor external output. The following wiring diagram demonstrates the typical wiring to achieve the required control.

Gas Concentration Control



WARNING
Failure to insert a circuit protection diode, shown as *above, will result in damage to the monitor if a voltage spike is created by the relay. (See Note: on page 46)*

Wiring the 0-5 V analogue output (wire between Pins 2 & 6)

The 0 to 5 V signal is a proportional signal based on the concentration of gas. The voltage out spans the specified gas sensor concentration range, for example: with the low concentration ozone sensor head: 0 V represents 0 ppm Ozone and 5 V represents 0.500 ppm Ozone.

Note: See "Diagnostic Features" on page 43 for output status conditions.

aeroQUAL

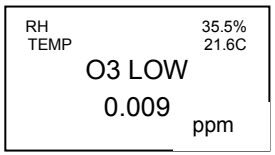
Operating Instructions

The following instructions detail the operation and set up of the monitor.

Turning the monitor on and off

To turn the monitor on, **press & hold the power button until the screen activates**. The monitor will turn on and the display will show **"AEROQUAL MONITOR S300 / S305 / S500 / S505 Vx.x",**. After 5 seconds the display will change to indicate the type of sensor head. **The monitor will warm up as described in the "Warm up" section on page 10.** Once warm up is complete the main display will appear (for example):

Series 300 & 500



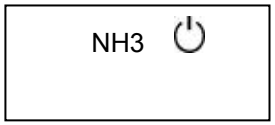
Series 305 & 505

Note: The number of decimal places shown will vary depending on the sensor head type and the gas being measured.

To turn the monitor off, **press and hold the power button for 2 seconds until the monitor beeps**. The display will now be blank and operation of the monitor will cease.

Turning Standby Mode on and off

To activate Standby Mode with the monitor on, press **the power button once**. This will stop operation of the monitor; however the sensor will be kept warm. This mode is used to conserve power between operations but keep the sensor ready to measure the gas concentration with only a short warm up phase as described in "Warm up" section on page 10. In this mode the display will be as shown below:

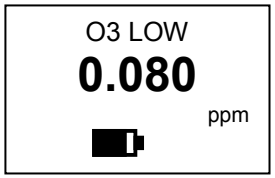


To return the monitor to operational mode **press the power button once**.

NOTE: When using a Carbon Dioxide sensor head in standby mode, the sensor runs at full power and the fan remains on.

Operating under Battery power

A battery indicator will appear at the bottom of the display when the monitor is operating under battery power only. The indicator shows the battery life remaining.



Sensor Head Failure

There are two possible Sensor failure modes, which will be indicated by one of the following messages on the display: -

"Sensor Failure, Replace sensor" *– The sensor head should be replaced as this indicates that there has been component failure.*

"Sensor aging"**:** *- This indicates that the sensor has reached the end of its usable life and the sensor head should be replaced as soon as possible. The measurement readings can no longer be relied upon to be within specification.*

aeroQUAL

Using the Menus and Key Functions

To enter the setup menu press The following menus will appear: -

Series 300 & 305 Menu

EXIT
ALARM POINTS
CONTROL POINTS
UNITS
MAX MIN AV
ZERO CAL

Series 500 & 505 Menu

EXIT
CLOCK SETUP
LOGGING SETUP
ALARM POINTS
CONTROL POINTS
UNITS
MAX MIN AV
ZERO CAL

Press or to scroll to the desired menu.

ZERO CAL

The "ZERO CAL" routine resets the zero point of the monitor. "ZERO CAL" must be carried out under carefully controlled conditions, as specified below.

- Minimum 24 hours warm up
- Clean air (charcoal filtered is best), no cross-sensitive gases
- Stable and low air flow around the monitor
- No vibration or movement of the monitor
- Temperature at 20°C ± 2°C (68°F ± 3.5°F)
- Relative Humidity of 50% ± 5%

An incorrect "ZERO CAL" does not cause permanent damage. The process should be repeated under the above conditions.

NOTE: Carbon Dioxide sensors MUST be calibrated in a certified Zero Air environment. If in doubt contact Aeroqual Limited.

Press and hold until the word **GO** appears next to Reset Routine. The routine will run for about 3-10 minutes and then beep to indicate completion. **Talk to your supplier or distributor if you have questions**.

Press to scroll down to the next menu choice.

Setting the Clock **Series 500 & 505 Monitor Only*

To enter Clock Setup press ↵ The following display will appear:

14:30:12 Oct 07 02	(Hours: Minutes: Seconds) (Month Day Year)

Changing Clock Hours

To change **Hours**, press ∧ or ∨

Press ↵ to confirm hours. Note: the clock is a 24-hour clock.

Once the change is confirmed the cursor will automatically scroll to the next parameter.

Changing Clock Minutes

To change **Minutes** press ∧ or ∨

Press ↵ to confirm minutes.

Changing Clock Seconds

To change **Seconds** press ∧ or ∨

Press ↵ to confirm minutes.

Changing the Month

To change the **Month** press ∧ or ∨

Press ↵ to confirm the month.

Changing the Day

To change the **Day** press ∧ or ∨

Press ↵ to confirm the day.

aeroQUAL

Changing the Year

To change the **Year** press ∧ or ∨

Press ↵ to confirm the year.

Press ∨ to scroll down to the next Menu choice.

Setting High and Low Alarms

To enter the Alarm Setup menu press ↵.

Setting the High Alarm

After entering the Alarm Setup Menu, the **'Alarm Hi'** will display.

ALARM HI 35 ppm

Press ∧ or ∨ to increase or decrease the setting.

Press ↵ to confirm change.

Setting the Low Alarm

Once the High Alarm setting has been confirmed, the cursor will automatically scroll to the **'Alarm Lo'** display.

ALARM LO 0.040 ppm

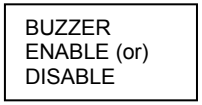
Press ∧ or ∨ to increase or decrease setting

Press ↵ to confirm change.

Note: This sets both the monitor alarm and the external alarm.

Enabling or Disabling the Alarm

Once the Low Alarm setting has been confirmed, the cursor will automatically scroll to the "Buzzer" display.



Press or to scroll between Enable or Disable.

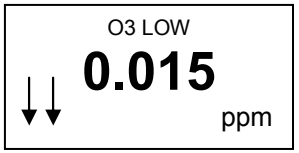
Press to confirm choice.

Note: If the Disable option is selected, the Alarm will be permanently muted. A 'P' on the right hand side of the Alarm Mute symbol will be displayed to indicate Permanent Mute.

Screen Display of High Alarm Condition

Two flashing arrow symbols pointing upwards will appear on the left hand side of the display, accompanied by a fast beeping sound when the Ozone concentration rises above 8.00 ppm.

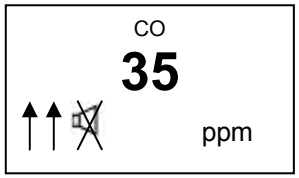
Screen Display of Low Alarm Condition



Two flashing arrow symbols pointing downwards will appear on the left hand side of the display, accompanied by a slow beeping sound when the Ozone concentration rises above 0.015 ppm.

aeroQUAL

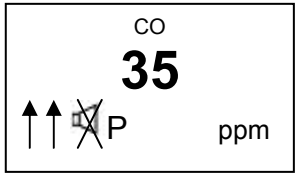
Screen Display of Alarm Mute



This is activated by pressing the alarm mute button, . Muting the high and low alarms using this button only mutes the alarm during that specific alarm condition. Once the concentration returns to within alarm limits, the alarm will reset.

A speaker symbol with a cross through the middle of it will appear on the right hand side of the display when an alarm condition exists and has been muted from the key pad. Once the alarm condition is removed and the alarm has reset the symbol will disappear from the screen.

Screen Display of Permanent Alarm Mute



The Alarm mute symbol, as above, will be permanently displayed on the screen until the alarm is once again re-enabled via the Alarm Setup Menu.

If an alarm condition arises when permanent mute has been activated, flashing arrows will appear on the display as described in the previous sections, however no sound will accompany the flashing arrows.

Press to scroll down to the next Menu choice.

Setting the Control Points

To enter the Control menu press .

Setting the Control High

After entering the Control Points menu, the 'Control Hi' display will appear.

CONTROL HI 0.080 ppm

Press or to increase or decrease the setting

Press to confirm change.

Setting the Control Low

Once the change has been confirmed, the cursor will automatically scroll to the 'Control Lo' display.

CONTROL LO 0.040 ppm

Press or to increase or decrease the setting

Press to confirm the change.

Press to scroll down to the next Menu choice

Note: Once the control settings have been set the monitor must be either put into "Standby" or switched off for the new settings to become effective. Once the monitor is put back into normal operating mode the new settings will become effective.

aeroQUAL

Setting up Data Logging Time Intervals

500&505 Series Only

To enter the Logging Setup menu press . The **Log Freq** display will appear.

LOG FREQ: 1 MIN

Press or to change the logging frequency in one-minute increments

Press to confirm change and following screen will be displayed.

CLEAR LOG NO

You can now elect to clear any logged data by selecting YES or NO if you wish to retain the data.

Press to toggle between NO and YES on the CLEAR LOG screen.

Press to confirm your selection and following screen will be displayed.

LOGGING OFF

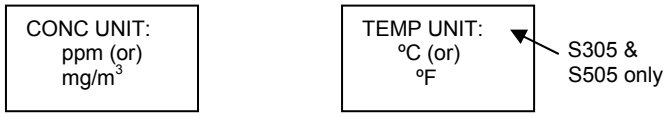
Press to toggle between OFF and ON on the LOGGING screen.

Press to confirm your selection and you will be returned to the main menu.

Press to scroll down to the next Menu choice

Changing Units of Measurement

To enter the **'UNITS'** menu press ↵ once for the concentration unit and again for temperature unit – see displays below.



Press ∧ or ∨ to scroll between 'ppm' &'mg/m^3' or 'ºC & ºF'

Press ↵ to confirm the unit selection

∨ Press to scroll down to the next Menu choice

The Max/Min/Average Measurement Cycle

Pressing ↵ scrolls between Start and Stop

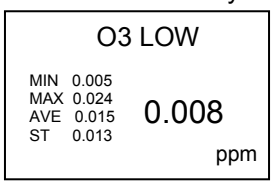
Press ∨ to scroll to 'EXIT'

Press ↵ to Exit out of Menu Setup. This will also Start or Stop the measurement cycle, depending on your menu selection.

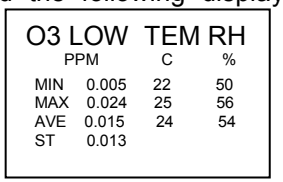
Note: There is a **quick key** option to Start or Stop the 'Max Min Average' measurement cycle, as follows:

From the Display Screen

Press and hold ∨ for two seconds until the monitor beeps. This will start the measurement cycle, and the following display will appear: -



S300 and S500



S305 and S505

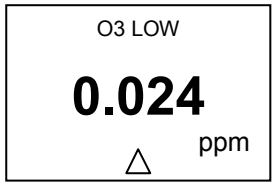
aeroQUAL

Similarly to stop the measurement cycle, press and hold ∨ for two seconds until the monitor beeps.

Note:
The MIN, MAX and AVE readings are the minimum, maximum and average readings over the period from the start of the cycle.
The ST value is the average over the last 15 minutes.

Starting and Stopping Data Logging **500&505 Series Only*

Press and hold ∧ for two seconds until the monitor beeps. This will start the data logging, and a triangle icon will appear on the bottom of the display: -



Similarly, to stop data logging, press and hold ∧ for two seconds until the monitor beeps. Once data logging has stopped the triangle icon will disappear.

Data logging Indicator: △

The triangle is an indication that data logging is active, and is also used as an indication of the presence of data, as described below:
-An empty triangle indicates that no data is stored
-A half full triangle indicates that some data is stored in the memory
-A full triangle indicates that the memory is full and needs downloading to the PC.

Clearing the Data Memory

In order to clear the data memory, data logging must firstly be stopped as described above. The memory can then be cleared by pressing and holding the alarm mute button for two seconds until the monitor beeps or use the CLEAR LOG function under LOGGING SETUP menu.

Aeroqual Monitor Software Instructions

The Aeroqual Monitor software for MS Windows comes bundled with Java™ 1.5.0 runtime virtual machine, a Java database, and all components necessary to run Aeroqual Monitor software in conjunction with the Series 500 and 505 monitor.
(NOTE: The Series 505 datalogs gas concentration as well as temperature and relative humidity)

Software Installation

Software License:

The Series 500 and 505 monitor comes supplied with Aeroqual data logging software. Aeroqual will retain ownership of all intellectual property in the Software. The buyer acknowledges that they are granted a perpetual, non-exclusive, non transferable license for the right to use the Software for the buyer's exclusive use and only in conjunction with Aeroqual Products (Intended use). The buyer will strictly adhere to the Intended Use of the Software and will not translate, adapt, reverse compile or otherwise alter the Software. The buyer undertakes not to disclose, assign, sell, rent, lend, sub license or otherwise transfer the Software.

Software features:

1. Real time gas monitoring and data logging.
2. Event logging. When the gas concentration exceeds a user-defined level, an event will be generated and stored in the database.
3. Logged Data Analysis with graphics view. Graphics view can be configured by the user.
4. Average gas concentration level can be shown on both Real Time gas monitoring and Logged Data Analysis graphs.
5. Gas concentration graphics views can be saved as JPG images.
6. Logged Data can be exported in other file formats such as plain text and MS Excel™ files.
7. Configuration of monitor settings and PC communication port settings from a PC.
8. Backup and restoration of logged data.
9. The Aeroqual sensor can be given a name or ID. This name can be changed.

aeroQUAL

10. The conversion factor for the unit of measurement [parts per million (ppm)] or [milligrams per cubic metre (mg/m^3)] can be changed on S300 and S500 monitors as well as the temperature unit (ºC or ºF) on S305 and S505 monitors.
11. Data that is logged onto the Series 500 and 505 monitor can be downloaded to a personal computer using the Aeroqual software provided.
12. Data from different Aeroqual sensor heads can be saved in the same database. However, the data from each sensor head has to be downloaded separately – see Setting Data Logging Functions on page 31.
13. Monitor version V5.0 and above are not compatible with previous versions of software.

System requirements:

Operating system:	Windows™ 2000, XP.
Processor:	600MHZ or above recommended
RAM:	256MB (minimum)
Disk space:	90MB (minimum)
Communications Port	Serial (or USB-to-serial adaptor)

CD-ROM Files:

S500 – x– x . exe
The Aeroqual Monitor software Windows installation file.

Installation of the Software:

Step 1: Insert CD-ROM into CD driver

Step 2: Browse CD-ROM and double click the installation file "S500 –x– x . exe", and then follow the instruction wizard until finished.

(For Windows Vista, unzip the Vista software which should then self-install).

Running the Software Program

Connect the Aeroqual Series 500 or 505 monitor to the COM port of your computer using the cable supplied (The default COM port setting is COM1. If COM2 is to be used, the COM port setting will need to be configured. Refer to page 29 "Configuration"). Turn the monitor on.

Start the program by either:-

- Selecting **Start -> Programs -> Aeroqual -> S500 Vx.x** or:-
- if the program shortcut has been placed on desktop, by double clicking the shortcut.

The following window will appear:

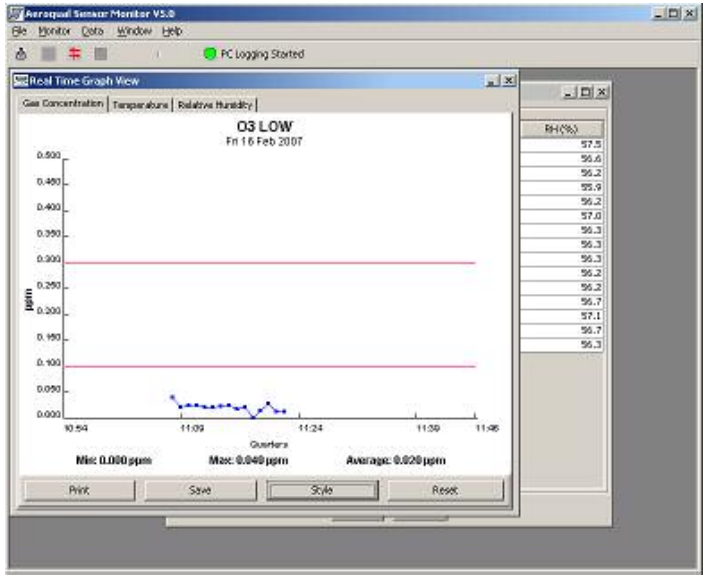


Figure 1: Aeroqual Monitor software main window

Setting up the Software and Monitor Parameters

This section of the manual will describe how to use the Software to set up the Alarms, External Control Limits, Logging Times, Concentration Units of measurement and Sensor Properties.

Click menu **Monitor -> Setup (or Ctrl P)**.

The monitor setup dialog box will appear (figure 2). Type in the required values or scroll up or down to set the desired values. Click the **Upload** button to synchronise the monitor values with those on the PC. Once the upload is complete the monitor will beep. Click **OK** to confirm the settings for the software.

In order to data log it is essential that you set the clock on the monitor to real time. This can be done from the key pad on the monitor (refer to page 17) or via the PC using the "Update Clock" button in the configuration menu.

aeroQUAL

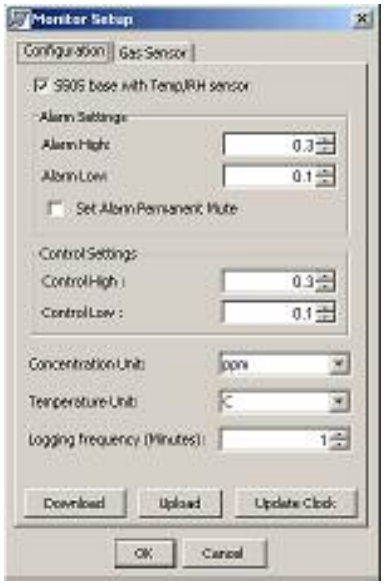


Figure 2: Monitor Configuration Dialog box

Monitor "Configuration" Dialog

- When using a Series 505, ensure **"S505 base with Temp/RH sensor"** box is checked. This configures the PC software for the S505 and displays a **"Temperature Unit"** field. If the S500 monitor is used, do not select this box.
  (The software default is for the S500)
- Note: Monitor settings can be loaded onto the PC by selecting the download button in the configuration dialog box.
- ***It is recommended that the required settings are entered via the PC using the Aeroqual Series 500 software and then uploaded to the monitor.***

Gas Sensor Properties Configuration

To enter the gas sensor configuration menu, Click **Monitor -> Setup (or Ctrl P)**

Select the "Gas Sensor" tab (Figure 3) on the next page.

Figure 3: Gas Sensor Configuration Dialogue Box

The sensor name field will always be in UPPER CASE with a maximum of 7 letters.

The ppm to mg/m^3 conversion factor can be altered to accommodate the various sensors that can be connected to the series 500 Monitor base.

By clicking the **Update** button, the current settings will be stored on the sensor head. The **View** button is used to view the current settings stored on the sensor head.

Communications Port Configuration (Serial Port*)

[if you do not have a serial port then a USB -to-Serial adaptor is required – contact Aeroqual for details.]*

Check the communication port into which the monitor serial cable has been plugged. If it is not COM1 (default) the configuration will need to be changed to COM2 or other user specified port.

Click **Monitor -> Com Port (or Ctrl M)** (figure 4).

Select **COM2** or other user specified port. The other settings should not be changed. Click OK to confirm the setting.

aeroQUAL

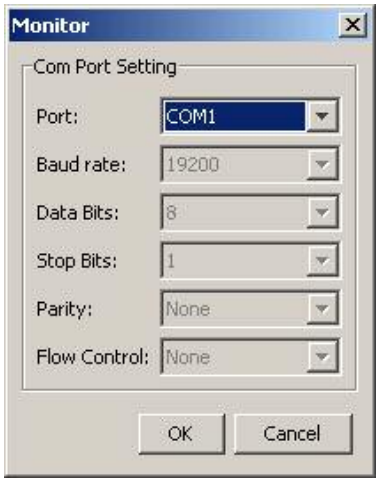


Figure 4: Com Port Settings

Setting the Graph Default Style

The Real Time View graph and Logged Data View graph properties can be configured from the graph style dialogue box. These include:

- the gas concentration upper and lower scales
- scale & time units
- graph line & background colours
- alarm set & control point line colours
- graph type (line or points)
- whether to show the average line or not

To enter the Graph Properties menu:-

Click **Data** -> **Graph** -> **Default Style**.

To change colours on the graph lines, click on the line colour. A colour chart will appear. Click on the desired colour. Click OK to accept – see Figure 5 on the next page.

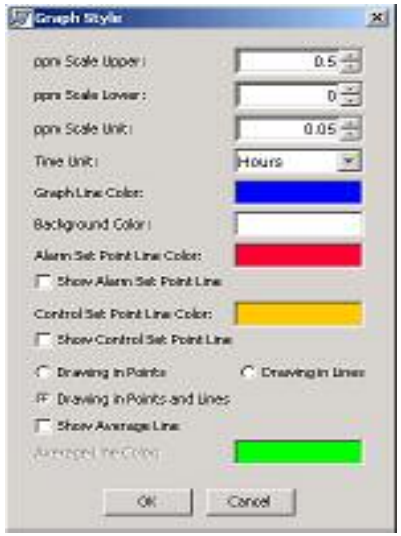


Figure 5 Graph Style Dialogue Box

Setting Data Logging Functions

Data Logging on the Series 500 and 505 monitors

The Series 500 monitor can log up to 4300 data points (3400 for Series 505). Data is logged to the onboard flash memory.

View Sensor Properties

This function is used to update sensor information in the data base and test connections. Click **Monitor -> View Sensor Properties** (see Figure 3). The monitor must be on and connected with the PC software running).

To update the data base sensor information, click "Save" after making the required changes.

To collect data from different gas sensors using the same Series 500 or 505 monitor, the sensor properties on PC data logging software must be updated each time a different gas sensor is used. If the sensor information is not stored in the data base click **Monitor**

aeroQUAL

-> View Sensor Properties (monitor must be on and connected with the PC software running), update the information and click "Save".

To download logged data from memory, click **File -> Download Logged Data** (Ctrl D) or, click the toolbar shortcut **button** .

A data download progress bar will appear while the data is downloading. Once that data download to the PC is complete, the monitor will beep and ask the user whether they wish to clear the logged data on the monitor. Data logged on the monitor must always be cleared manually otherwise the data will continue to be stored in a data base in the Aeroqual Monitor's memory.

If for any reason, the data download does not complete, is terminated or stops:-

- turn off the monitor to prevent any data loss.
- delete the data that has been downloaded to the PC
- close the PC software program
- repeat the downloading process with the monitor on, connected and with the PC software running.

Data Logging directly to a PC

To data log directly to a PC ensure that the serial cable is connected to the monitor and to the PC.

Click the **File -> Start PC Data Logging** or use the button on the toolbar.

The data will be logged directly to the database on the PC. No data will be stored in the monitor memory in this mode of operation. However, if PC data logging is stopped (by clicking the **Stop** button on the toolbar), the data from this point onwards will be stored in the Series 500/505 monitor memory.

While logging directly to a PC, the Real Time View Graph as shown on the next page will appear on the PC screen.

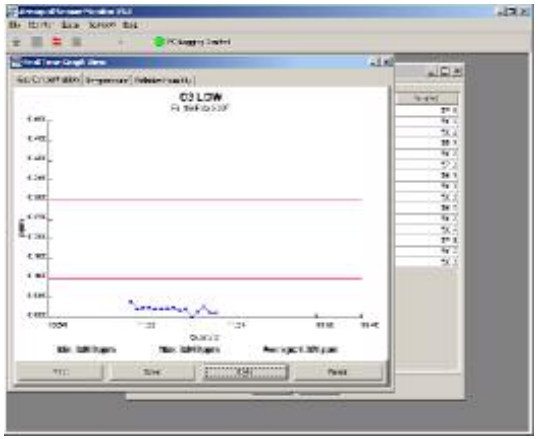


Figure 6 Real Time Graph View

Note: Temperature & humidity graphs will appear only when the PC software has been configured for a Series 505 monitor.

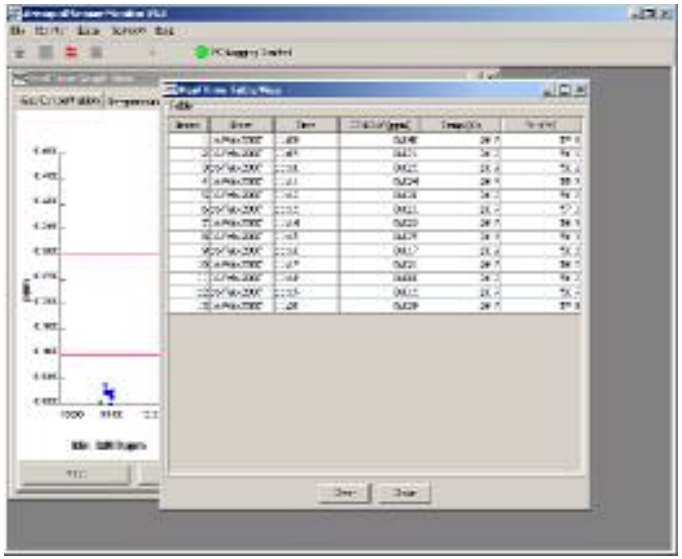


Figure 7 Real Time Table View

Note: As new data is received in Figure 7, it will be added to the bottom of the table. The maximum number of rows in the table view is 50.

aeroQUAL

Graphing and Data Analysis Functions

To View Logged Data as a graph

Ensure that all data has been downloaded from the monitor to the PC as per the Data Logging section on page 31. To view the downloaded or logged data as a graph, click **Data -> Graph-> Logged Data (or Ctrl G)** to launch the Logged Data Graph View (see figure 8 below).

Select the date and time range of the data to be viewed as well as the desired time units* and sensor.
(* Note: In the Time Unit drop-down box "Quarters" refers to 15 minute time periods)

Click the **Apply** button to load the data.

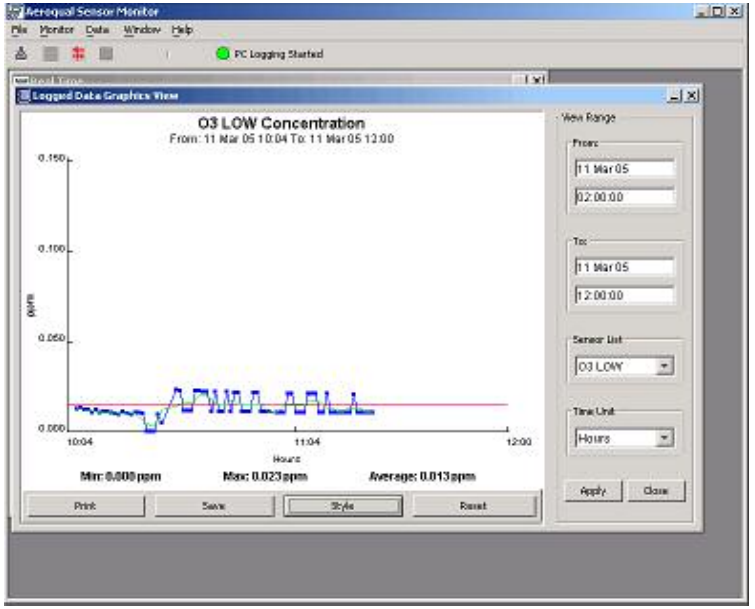


Figure 8 Logged Data Graph View

To print a Logged Data Graphics View

To print the Logged Data Graph View click **Print.**

A data graph title input window will appear “Concentration for …”. Input the required title to identify the location from which the data was recorded. Click **OK** to confirm and follow the remaining instructions to print the graph.

To Save Graph as an Image

Click the **Save** button (Figure 8), then give it a name and it will be saved as a JPG file.

To Change the Graph Style

Click the **Style** button (Figure 8) and the graph style dialog box will appear. Select the appropriate value and click OK to confirm.

To expand a selected area of the Graph

With Figure 8 displayed, using your mouse, drag to select an area of the graph. Then release the mouse and the selected area will be expanded.

To reset the Graph to the Default Style

With Figure 8 displayed, simply click the **Reset** button

To View Logged Data in a Table

To view logged data in a table format, click
Data -> Table -> Logged Data (or Ctrl E).

The Logged Data Table window will be launched (figure 9). Select the desired date and time ranges and sensor. Press **Apply** to confirm the selection and load the data. The data table can also be sorted by clicking a column header.

aeroQUAL

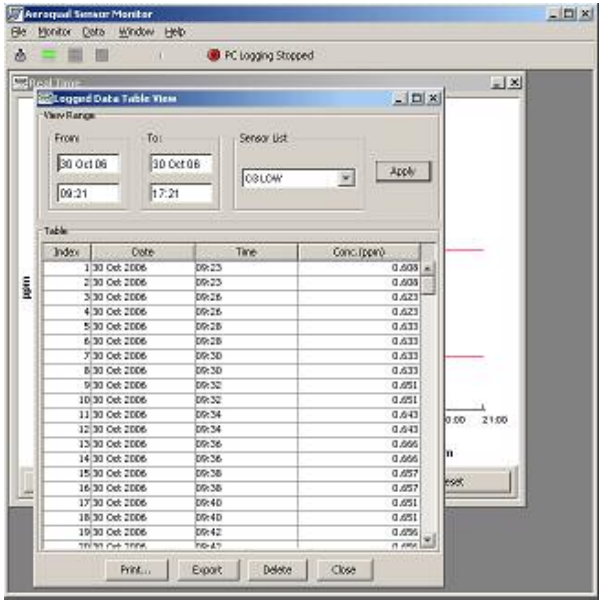


Figure 9 Logged Data Table View

When this data is no longer needed it can be deleted by clicking the **Delete** button on the Logged Data Table window (Figure 9). This will delete the individual data points from the database.

To print a table of logged data

To print a table of logged data, click the **Print** button on the Logged Data Table window (Figure 9). A data table title input window will appear “Gas Concentration Logged Data for ….”. Input the required title to identify the location from which the data was recorded. Click **OK** to confirm and follow the remaining instructions to print the table.

To Export Data

To export data, click **File -> Export Logged Data**
To export the data to a file, click the **Export** button on the Logged Data Table window (Figure 9), then select a directory and choose a file format – either plain text or MS Excel file and type in a file name. Click **Save** to export the data.

Daily Summary Analysis

The Daily Summary Analysis is a summary for each day, from midnight to midnight, of the Minimum, Maximum and Average (Gas) reading over the 24 hour period.

To Create and view the "daily analysis"

To view the created daily summary:
Click menu **Data -> Analysis -> Daily Analysis.** The daily summary view window will be launched (see figure10).

Select the data range and sensor. Press **Apply** to create the daily analysis and load it into the view window.
Note: This process can take up to 10 minutes or longer to complete and must not be interrupted (the time taken is dependant on the volume of data that needs to be processed.

The summary data files can be exported to files such as MS Excel (click the **Export** button).

The data can also be deleted by clicking the **Delete** button. This will **not** delete the individual data points from the database, only the daily summary data.

Figure 10 Daily Analysis Summary View

aeroQUAL

Viewing Logged Events

An event will be generated when the gas concentration exceeds the alarm setpoints. A warning dialog box as shown in figure 11 will appear once an alarm setpoint has been exceeded. The event dialog can be used to record how the problem was handled and by whom. By clicking the OK button, the event will be stored into the database.

To view these logged events, click menu **Data** -> **Table** -> **Logged Events (Ctrl L).** The Logged Event View window will be launched, figure 12. The event data can be exported to an MS Excel or plain text file by clicking the **Export** button in the Logged Event View window. This data can also be deleted by clicking the **Delete** button in figure 12.

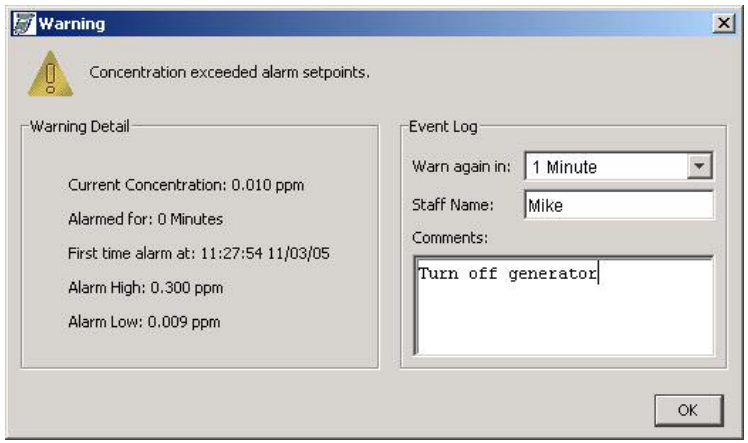


Figure 11 Event Log Dialogue

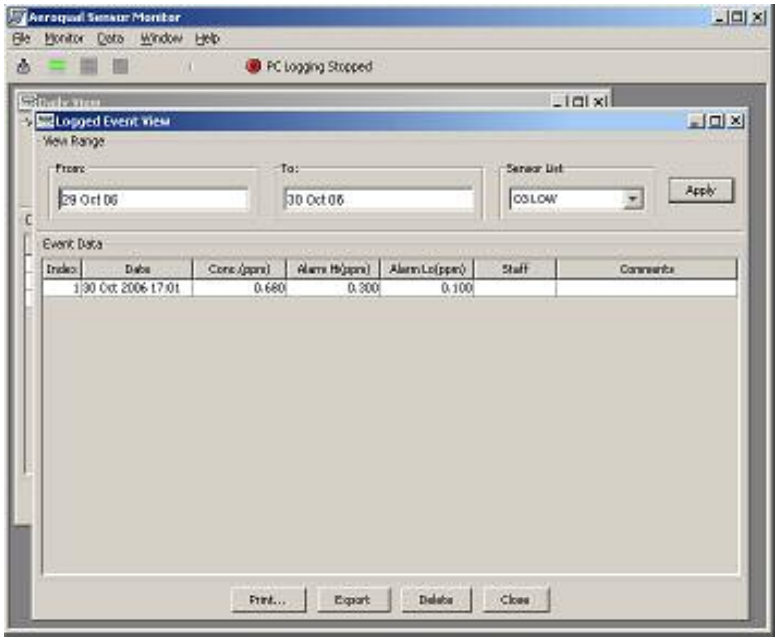


Figure 12 Logged Event view

Advanced Data Management

To Archive the database as a zipped format file

Archive logged data by: click **File -> Zip Database**
Select a directory and input a file name to backup all the current stored data to a zipped file.

Viewing archived data

To view an archived database it is important that any existing data logging function is not interrupted. ***It is recommended that you do not view archived data on the same PC being used for data***

aeroQUAL

logging, as when data is restored, the current data in the database will be lost unless it has been zipped.

To view an archived database on a different PC

- Install the Aeroqual Monitor Software to the PC if not already installed
- Copy the zipped file to the PC
- Click **File-->unzip Database**
- Select the zipped file and click **OK**
- View and analyze data as required

To view an archived database on the same PC

- Stop PC data logging (data logging will now be performed by the monitor)
- Zip existing database
- Unzip archived database (**File -> Unzip Database)**
- View and analyze data as required **(Data -> Table -> Logged)**
- Zip archive database
- Unzip existing database
- Get logged data from the monitor (Downloads data from monitor that was logged while you viewed the archive database)
  Start PC data logging (This will resume the data logging without loss of data).

Troubleshooting

Series 300 / 305 / 500 / 505

Fault Description	Possible cause	Remedy
No power	Lead connection broken	Reconnect power lead
	Power supply failure	Replace 12V DC power supply
	Battery flat	Recharge battery
	S300,305,500 & 505 damaged	Replace unit
	Sensor head damaged	Replace sensor head
External alarm and control doesn't work correctly	Incorrect RJ12 pins used	Check pins and wire correctly
	No diode across external relay coil	Fit diode across external relay coil
	Diode polarity incorrect	Fit diode correctly
Sensor failure when the sensor is new	Insufficient warm up	Run the sensor on full power for 24-48 hours.
	Air contaminated	Move the sensor to cleaner environment and check reading
	Sensor damaged	Replace sensor
Reading high under zero gas conditions	Background gas level higher than normal	Move sensor to clean air and check reading is zero or close to zero
	Interferent gas present	Move sensor to clean air and check reading is zero or close to zero
	Sensor zero drift	ZERO CAL sensor in a clean, stable background
	Sensor damaged	Replace sensor

aeroQUAL

Fault Description	Possible cause	Remedy
Reading lower than expected reading in the presence of sensor gas	Sensor correct	Check calibration of gas generator.
	Sensor inlet contaminated	Clean sensor inlet filter and mesh
	Sensor fan failed	Replace sensor
	Interferent gas present	Move sensor to clean air and check reading upon exposure to known gas concentration
	Gas reactive and decomposing before detection	Move the monitor closer to the source of the gas
	Local air flow too high (ozone sensors) or too low (VOC and ammonia sensors)	Modify the airflow into and around sensor head.
	Sensor calibration lost	Replace /refurbish sensor
Reading higher than expected in the presence of sensor gas	Sensor correct	Check calibration of gas generator.
	Interferent gas present	Move sensor to clean air and check reading upon exposure to known gas concentration
	Sensor calibration lost	Replace /refurbish sensor
Reading unstable	Power supply unstable	Install stable power supply
	Power supply current rating incorrect	Install power supply with correct rating
	Local air flow too high	Reduce air flow
	Environmental conditions fluctuating	Reduce fluctuations
	EMI noise picked up via RS232 cable (S500/505 unit only) and PC	Unplug cable to determine if this reduces the instability. If this solves the problem then isolate the power on PC.
RS232 communications unstable (S500 & 505 only)	Connections broken	Reconnect leads
	COM Port settings incorrect	Setup COM port correctly
	Clock setting incorrect	Synchronise clock with PC. If this does not work then the Monitor clock battery may be flat. Return monitor to Aeroqual for battery replacement.

Diagnostic Features

Sensor Failure

The S300, 305, 500 & 505 monitors have inbuilt diagnostics to detect sensor faults. If the sensor fails it can be easily replaced by simply removing and installing a new one. The failed sensor can be sent back to Aeroqual for refurbishment or disposal.

Table of monitor status conditions

Fault description	LCD screen	0-5 V output	Control output	Low alarm output	High alarm output	Data logging (S500 only)
No fault	Valid gas reading	Reading proportional to gas reading	As set by user	As set by user	As set by user	valid gas reading
Sensor failed fault	Sensor failure	5 V	open	closed	closed	9999
Sensor aging fault	Valid gas Reading + Sensor aging	Reading proportional to gas reading	As set by user	As set by user	As set by user	valid gas reading
Communication s failure	Unit will turn off	0 V	open	open	open	No output
Sensor standby	Standby symbol	0 V	open	open	open	No output

Care and Maintenance

Your Aeroqual Monitor is a product of superior design and quality and should be treated with care. When using your Aeroqual Monitor:

- Keep it and all its parts and accessories out of the reach of small children.
- Keep it dry. Avoid water and/or condensation as humidity and liquids containing minerals may corrode electronic circuits.
- Do not use or store in dusty, dirty areas.
- Do not store or turn off the monitor in temperatures below 10°C.
- This unit is designed for use at temperatures between -5°C and +50°C (23°F and 120°F). Sudden changes in temperature will cause condensation that may damage the electronic componentry.
- Do not attempt to open. Non-expert handling of the device may cause damage.
- Do not drop, knock or shake as this could lead to internal damage.
- Do not use harsh chemicals, cleaning solvents or strong detergents for cleaning. Wipe with a soft cloth slightly dampened with a mild soap-and-water solution.

aeroQUAL

Disposal / Recycling

Please note that this is an electronic product and disposal should be in line with your local or country legislation. The plastic casing of the product is made from a Polycarbonate / ABS blended material (PC + ABS) and is marked accordingly.

Specifications – Series 300, 305, 500 & 505

Series 300, 305, 500 and 505 Monitor Bases

Measurement units	ppm or mg/m^3
Removable / replaceable sensor head	Yes
On-board alarm	Yes
Alarm status displayed	Yes
Low battery indication	Yes
Alarm mute function	Yes
Sensor condition status	Yes
Stand-by mode	Yes
External signal for alarms & control * (see note below)	12 VDC or switch to GND (150 mA max)
External signal functions	LoALM, HiALM & Control
Analogue output	0 - 5 V
Power supply	12 VDC, 800 mA
Rechargeable battery pack (optional)	9.6V Ni-MH
Portable (with optional battery pack)	Yes
Permanently fixable	Screw fix
Remote Sensor Capability	Yes

**** Series 500 & 505 only:***

Data interface with PC	Serial RS232
On Board Data Logging	4,300 data points on S500 3,400 data points on S505
Data logging independent of PC	Yes
Data logging direct to PC	Yes
On-board real-time clock	Yes
Data logging software supplied	Yes

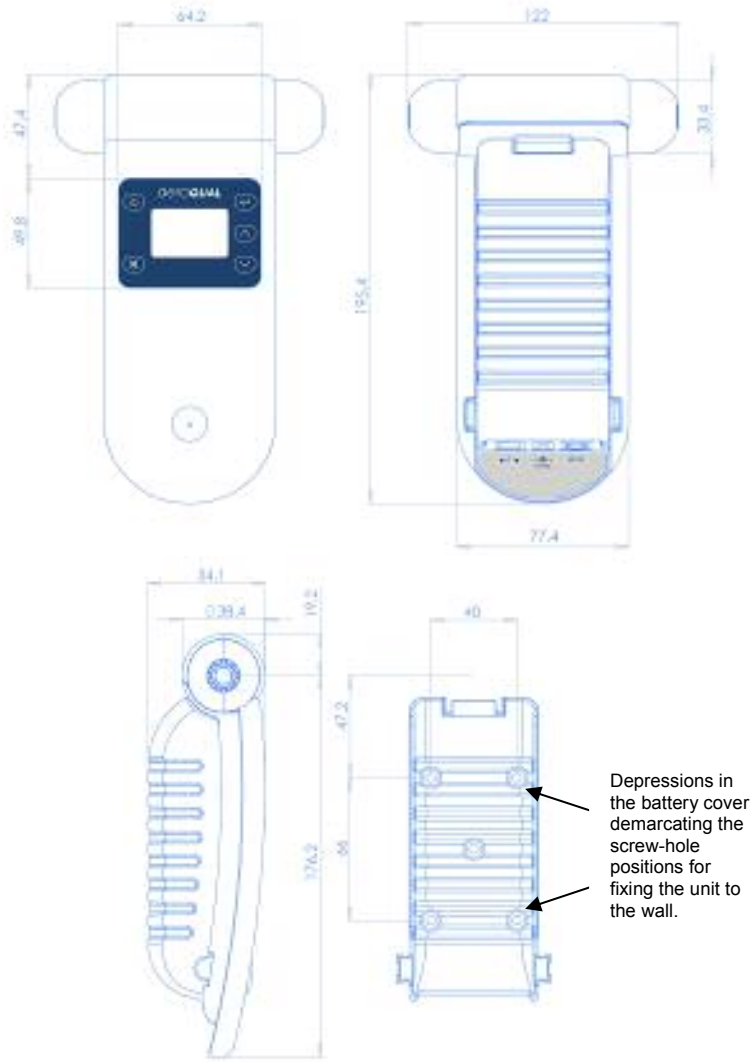
**** Series 305 & 505 only:***

Temperature & Relative Humidity Sensor	Yes

NOTE:

- All of the transistor outputs (those shown asterisked above *) are open collector current sink. The maximum rating of these transistor outputs is 12VDC at 150mA
- Should you connect a relay or any other inductive load to the transistor outputs, a back EMF suppression diode must be fitted across the load.
- Aeroqual accepts no responsibility for damage to this product or any other issues arising from the non-compliance with the above directives. Failure to implement these directives will invalidate the warranty on this product

Drawings



aeroQUAL

SENSOR HEAD SPECIFICATIONS

Sensor	Calibrated Range	Maximum Exposure	LDL	Accuracy	Resolution	Response Time (T90)	Sampling Method[5]	Operating Temp. (environmental)	Relative Humidity (non-condensing)
Ammonia 0 - 100 ppm	0 - 100	200	0.5 ppm	<± 5ppm 0 - 100 ppm	0.1 ppm	< 60 s	F	-20°C to 40°C	5 to 95%
Ammonia (leak) 0 - 1000 ppm	0 - 1000	2000	2 ppm	<± 15%	1 ppm	< 60 s	F	-20°C to 40°C	5 to 95%
Carbon monoxide 0 - 100 ppm	0 - 100	200	0.5 ppm	<± 5 ppm	0.1 ppm	< 150 s	F	0°C to 40°C	5 to 95%
Carbon monoxide 0 - 1000 ppm	0 - 1000	2000	1 ppm	<± 10%	1 ppm	< 150 s	F	0°C to 40°C	5 to 95%
Carbon dioxide 0 - 2000 ppm	0 - 2000	NA	-	<± (40 ppm + 3%)	10 ppm	< 60 s	F	0 to 40°C	5 to 95%
Carbon dioxide 0 - 5000 ppm	0 - 5000	NA	-	<± (150 ppm + 5%)	10 ppm	< 60 s	F	0 to 40°C	5 to 95%
Carbon dioxide 0 - 5.00%	0 - 5.00%	NA	-	<± 5%	0.01%	< 60 s	F	0 to 40°C	5 to 95%
Hydrogen 0 - 5000 ppm [1]	0 - 5000	20000	5 ppm	<± 10 %	1 ppm	< 90 s	F	-20°C to 40°C	5 to 95%
Hydrogen sulphide 0 - 10 ppm [1]	0 - 10	25	10 ppb	<± 0.5 ppm	0.01 ppm	< 60 s	D	-20°C to 40°C	5 to 95%
Hydrogen sulphide 0 - 50 ppm	0 - 50	100	0.05 ppm	<± 1 ppm 0 - 10 ppm <± 2 ppm 10 - 50 ppm	0.1 ppm	< 60 s	D	-20°C to 40°C	5 to 95%
Methane 0 - 10000 ppm	0 - 9999	10000	-	<± 15%	1 ppm	< 60 s	F	0°C to 40°C	30 to 80%
Ozone 0 - 0.150 ppm	0 - 0.150	0.250	1 ppb	<± 0.005 ppm	0.001 ppm	< 70 s	F	-5°C to 40°C	5 to 95%
Ozone 0 - 0.5 ppm	0 - 0.500	1	1 ppb	<±0.008ppm 0 - 0.1ppm <± 10% 0.1 - 0.5ppm	0.001 ppm	< 60 s	F	-5°C to 40°C	5 to 95%

SENSOR HEAD SPECIFICATIONS (cont'd)

Sensor	Calibrated Range	Maximum Exposure	LDL	Accuracy	Resolution	Response Time (T90)	Sampling Method[5]	Operating Temp. (environmental)	Relative Humidity (non-condensing)
Ozone 0.5 - 20 ppm[2]	0.5 - 20	25	10 ppb	<± 10% 0.5 - 2 ppm <± 15% 2 - 20 ppm	0.01 ppm	< 35 s	F	-5°C to 40°C	5 to 95%
Ozone (leak)	For ozone leak detection at IDLH (Immediate Dangerous to Life & Health – 5ppm)				0.01 ppm	< 10 s	F	-5°C to 40°C	5 to 95%
NMHC[3,4] 0 - 25 ppm	0 - 25	50	0.1 ppm	<± 10% 0.1 - 25 ppm	0.1 ppm	< 60 s	F	-20°C to 40°C	5 to 95%
Perchloroethylene 0 - 200 ppm	0 - 200	250	1 ppm	<± 5 ppm 0 - 50 ppm <± 10% 50 - 200 ppm	1 ppm	< 5 s (T50)	F	0°C to 40°C	30 to 80%
Sulphur dioxide 0 - 10 ppm	0 - 10	20	0.2 ppm	<± 0.5 ppm	0.01 ppm	< 60 s	F	-20°C to 40°C	5 to 95%
Sulphur dioxide 0 - 100 ppm	0 - 100	200	0.5 ppm	<± 10%	0.1 ppm	< 60 s	D	-20°C to 40°C	5 to 95%
VOC 0-25ppm[4]	0 - 25	50	0.1 ppm	<± 10% 0.1 - 25 ppm	0.1 ppm	< 60 s	F	-20°C to 40°C	5 to 95%
VOC 0-500 ppm[4]	0 - 500	1000	1 ppm	<± 10%	1 ppm	< 60 s	F	-20°C to 40°C	5 to 95%
Other Gases	**Contact Aeroqual with specific requirements for gas and concentration**								
Temperature	-20 to 100° C	-40 to 120° C	0.01° C	<± 0.3°C	0.01°C	< 1 s	-	-40 to 120° C	0 to 100%
Humidity	0 to 100%	100%	1% RH	2% RH	1% RH	< 1 s	-	-40 to 120° C	0 to 100%

1 **Other specific concentrations available on request**

2 **Accuracy < 0.5 ppm is unspecified (for applications that require accurate measurement < 0.5 ppm use low or ultra-low sensor heads)**

3 Non Methane Hydrocarbon sensor (low sensitivity to alcohols & esters)

4 Calibrated against isobutylene. Other specific VOC calibrations are available on request

5 D= diffusion, F=fan

aeroQUAL

NOTES

NOTES

aeroQUAL

NOTES